Figure 1 : Isolation of monokaryotic strain deficient in laccase activity.
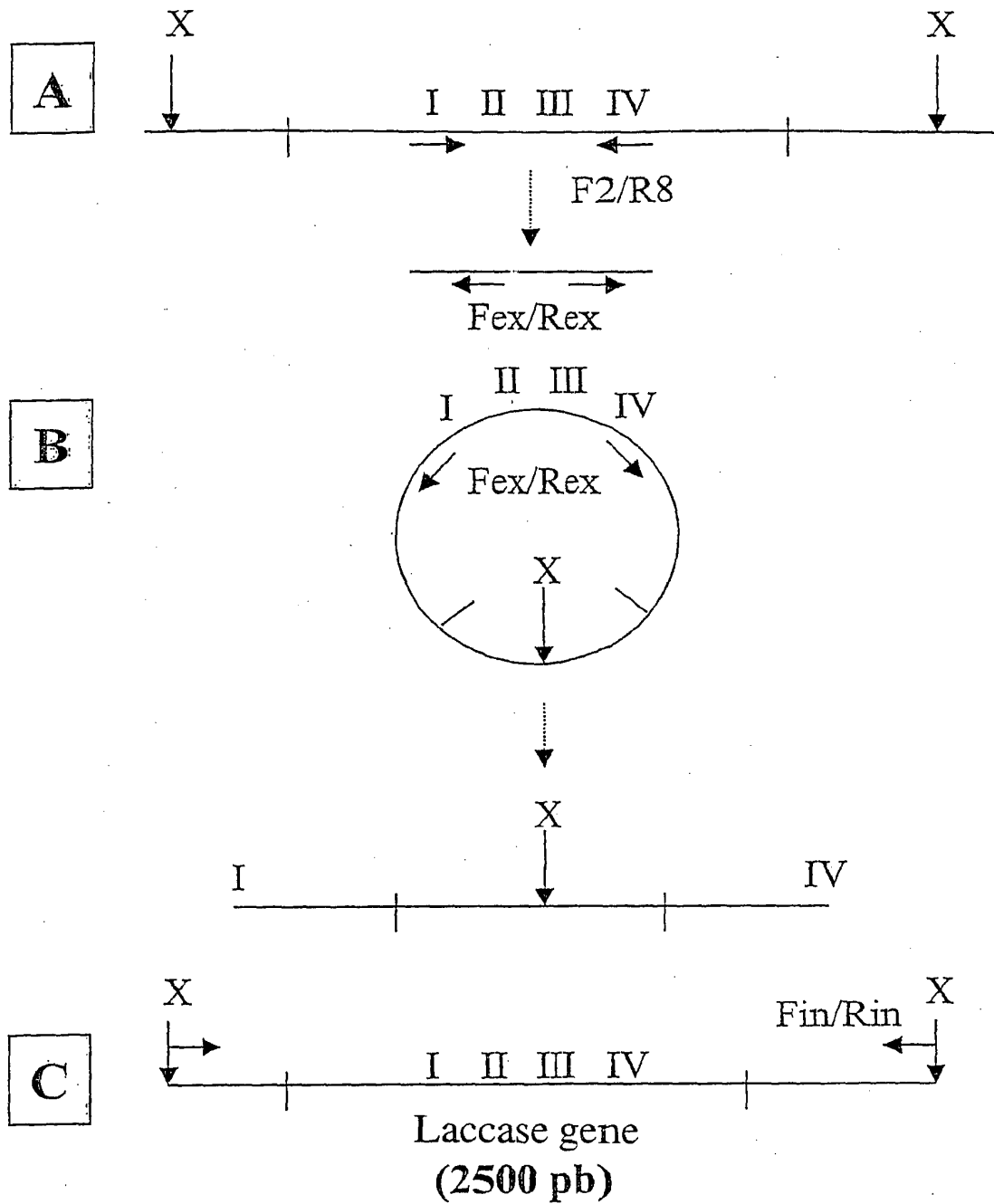
Figure 2 : Isolation of the gene coding for the laccase of *Pycnoporus cinnabarinus* laccase.
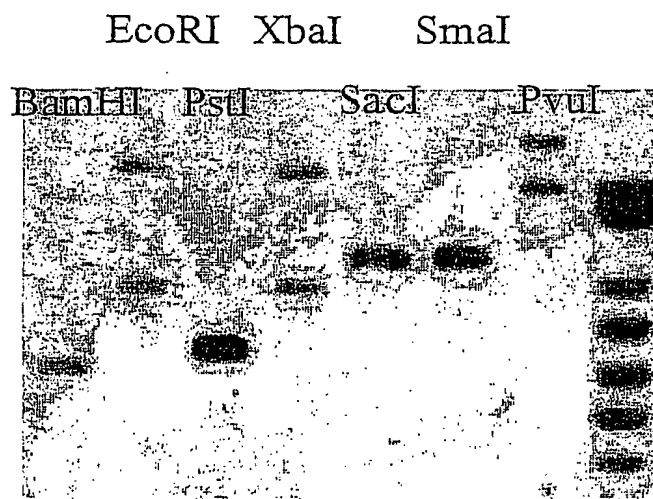
Figure 3 : Southern blot study of the gene coding for the laccase of *Pycnoporus cinnabarinus*.

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CTGCAGACATCTGGAGCGCCTGTCTTTCCCCTAGTATAAATGATGTCTGTCCGCAGGTCCTTGAAGACCGCTCGAGTCCCACTTGAGTTTTAGGTAGGAC       100

CTGTCCACCAAACCCCTCTTTCTGATCATGTCGGAGGTTCCAGTCCCTCTTCTTCTTCTTCGTCCTCGTCTCCCTCACCGCTGTGGCCAACGCAGCCATAGGGC    200
                      M  S  R  F  Q  S  L  F  F  F  V  L  V  S  L  T  A  V  A  N  A  A  I  G  P   25
CTGTGGCGGACCTGACCCTTACCAATGCCCAGGTCAGCCCCGATGGCTTCGCTCGCGAGGCCGTCGTGGTGAACGGTATCACCCCTGCCCCTCTCATCAC        300
   V  A  D  L  T  L  T  N  A  Q  V  S  P  D  G  F  A  R  E  A  V  V  V  N  G  I  T  P  A  P  L  I  T   58
AGGCAATAAGgtatgtatatgctgctcgtccctcagagctacatacatctgatccacaatcgtttagGGCGATCGATTCCAGCTCAATGTCATCGACCAG        400
   G  N  K                                                                  G  D  R  F  Q  L  N  V  I  D  Q   72
                                                                                                      F2
TTGACAAATCATACCATGTTGAAAACATCTAGTATTgtaagggttcagttttttcccgactaccatgttattgaccatcaccactcgtag CATTGGCACGG    500
L  T  N  H  T  M  L  K  T  S  S  I                                                          H  W  H  G   88
                                                                                                    (I)
CTTCTTCCAGCAAGGCACGAACTGGGCCGATGGTCCCGCGTTCGTGAACCAGTGTCCCATCGCTTCGGGCCACTCGTT CTTGTATGACTTTCAAGTTCCC    600
_F_ E  Q  Q  G  T  N  W  A  D  G  P  A  F  V  N  Q  C  P  I  A  S  G  H  S  F  L  Y  D  F  Q  V  P   121
(I)
GACCAAGCAGgtacgaattccgtacacgtttcattgcgtcgcaactaaacctcctcttactagGGACTTTCTGGTACCATAGCCATCTCTCCACGCAATA    700
D  Q  A  G                                                       T  F  W  I  H  S  H  L  S  T  Q  Y  137
     (II)                                                          (II)
CTGCGATGGTTTGAGGGGGCCTTTCGTCGTCTACGACCCCAACGATCCTCACGCTAGCCTGTATGACATTGATAACGgtgagcagatcatggtatcgcaa    800
   C  D  G  L  R  G  P  F  V  V  Y  D  P  N  D  P  H  A  S  L  Y  D  I  D  N  D                          163
tattgcgtccacttatgcttcctggcatccagACGACACTGTCATTACGCTGGCTGATTGGTATCACGTTGCTGCCAAGCTCGGACCTCGCTTCCCgtac    900
                                 D  T  V  I  T  L  A  D  W  Y  H  V  A  A  K  L  G  P  R  F  P         184
gtgtcaaatgtctacgagagatctcacatatacgactagactcacttcgctgattacagATTTGGCTCCGATTCAACCCTTATCAATGGACTTGGTCGAA    1000
                                                            F  G  S  D  S  T  L  I  N  G  L  G  R  T  198
CCACTGGCATAGCACCGTCCGACTTGGCAGTTATCAAGGTCACGCAGGGCAAGCGgtaagtatggatggtcatcactgcacattggctctgatacatggc    1100
   T  G  I  A  P  S  D  L  A  V  I  R  V  T  Q  G  K  R                                                 216
cttgtttccacagCTACCGCTTCCGCTTGGTGTCGCTTTCTTGCGATCCGAACCATACATTCAGCATTGATAATCACACAATGACTATAATTGAGGCGGA   1200
             Y  R  F  R  L  V  S  L  S  C  D  P  N  H  T  M  T  I  I  E  A  D  245
CTCGATCAACACTCAACCCCTAGAGGTTGATTCAATCCAGATTTTTGCCGCGCAGCGCTACTCCTTCGTGgtagg tcgtaggctcctgtcatcaagtttg    1300
   S  I  N  T  Q  P  L  E  V  D  S  I  Q  I  F  A  A  Q  R  Y  S  F  V                                 268
cagacattcttagatacacctttttcaatgcagCTGGATGCTAGCCAGCCGGTGGATAACTACTGGATCCGCGCAAACCCTGCCTTCGGAAACACAGGTT    1400
                                 L  D  A  S  Q  P  V  D  N  Y  W  I  R  A  N  P  A  F  G  N  T  G  F  291
TTGCTGGTGGAATCAATTCTGCCATCCTGCGTTATGATGGCGCACCCGAGATCGAGCCTACGTCTGTCCAGACTACTCCTACGAAGCCTCTGAACGAGGT    1500
   A  G  G  I  N  S  A  I  L  R  Y  D  G  A  P  E  I  E  P  T  S  V  Q  T  T  P  T  K  P  L  N  E  V  324
CGACTTGCATCCTCTCTCGCCTATGCCTGTGgtacgtgtctcaaagaacctcgatcactaagtgcatgtcaactcatatggtgcatgacagCCTGGCAGC    1600
   D  L  H  P  L  S  P  M  P  V                                                            P  G  S  337
CCCGAGCCCGGAGGTGTCGACAAGCCTCTGAACTTGGTCTTCAACTTCgtgagtactggcgcgcttccgtagcacacgttcgaacaaagcctgataccat    1700
   P  E  P  G  G  V  D  K  P  L  N  L  V  F  N  F                                                       353
gcagAACGGCACCAACTTCTTCATCAACGACCACACCTTTGTCCCGCCGTCTGTCCCAGTCTTGCTACAAATCCTCAGTGGGGCGCAGGCGGCTCAGGAC    1800
    N  G  T  N  F  F  I  N  D  H  T  F  V  P  P  S  V  P  V  L  L  Q  I  L  S  G  A  Q  A  A  Q  D  385
CTGGTCCCGGAGGGCAGCGTGTTCGTTCTTCCCAGCAACTCGTCCATTGAGATATCCTT CCCTGCCACTGCCAATGCCCTGGATTCCCCCATCCGTTCC    1900
L  V  P  E  G  S  V  F  V  L  P  S  N  S  S  I  E  I  S  F  P  A  T  A  N  A  P  G  F  P  H  P  F  H  419
                                                                                          (III)
ACTTGCACGGTgtacgtctgccctccctcgtctaaaggcggagtcgatatctgactcccatcacagCACGCCTTCGCTGTCGTCCGGAGCGCC GGGAGC    2000
   L  H  G                                                           H  A  F  A  V  V  R  S  A  G  S  433
   (III)                                                            (III)
AGCCGTCTACAACTACGACAACCCGATCTTCCGCGACGTCGTCAGCACCGGCCAGCCCGGCGACA ACGTCACGATTCGCTTCGAGACCAATAACCCAGGCC   2100
S  V  Y  N  Y  D  N  P  I  F  R  D  V  V  S  T  G  Q  P  G  D  N  V  T  I  R  F  E  T  N  N  P  G  P  467
   R8
CGTGGTTCCTCCACTGCCACATTGACTTCCACCTCGACGCAGGCTTTGCTGTAGTCATGGCCGAGGACACTCCGGACACCAAGGCCGCGAAC CCTGTTCC    2200
   W  E  L  H  C  H  I  D  F  H  L  D  A  G  F  A  V  V  M  A  E  D  T  P  D  T  K  A  A  N  P  V  P  500
   (IV)      (IV)            (IV)                (IV)
TCAGGCGTGGTCGGACTTGTGCCCCATCTATGATGCACTTGACCCCAGCGACCTCTGAGCGGGATTGTTACTGTGACCTGGT GTGGGGGGAACATGTCGA    2300
   Q  A  W  S  D  L  C  P  I  Y  D  A  L  D  P  S  D  L  .                                             518
GGGCTTTCATCGATCAGGGACTTTCAAGGTTGGCATAATATACCTCACGGCCTGGATGACTCGGACAGCGTGTGGGCGTGGGTGTAACTCTGCTTGATGT    2400
TGAAAAAAGGATTTTATGTAGAACAATTTATGAGCAATCAGCAATCAATAGGATTGTGTCGGTTTCGACGAAATGTCTTGTCTCCCTGACATTACTTTTG    2500
TGCGAGAAATGGGTCCATGATACACATCATTGAGCTCTCAATACCAAGAAGGATTACCCATGTCAATACCCAAGATCATGTCTTCGCTGTCCGCAATGG    2600
TCTCATGTTGCGTTGAGCAGATCGCAGTACGTTGAAAAGCGATTAGTAT TACATGCAACATGCAACATTTGGAAGGGGGCATGCAGAGGTTCAGCTCGCG    2700
TCAGTCGGCCAAGTAGCGACCTTTGCCGCACTGCCTGTTAAACCTGAACGTATGCTTCAGAACTCCGTCGGTATCGAGAGCGATCGTGTACGTTCCGGGAT    2800
AGATCCATTGATCCCCGCTCTGGTCGGCGCGTGCGATGGCCCCGAGCGTCACCGGCAGCTTCGCGATCGCGCTTTTCCTAGGGGCGAGGCCGTGTACCCG    2900
CGTGTACGAGACGAGCTGCTTGTTCGGGTGGGGCGAAGGCCCGAAGGAGCCACTCACGAAGAGCAATGCGACGTAATCCGAGGTAGCCTTGCCCGTGTTA    3000
GTCACACGCACGGAGAACGTGTCGAGCGGCGCGAGGTCGAGGAAGGCGGCGCTCTTCTGACCGCGCTGTACGAGGTCGGAAATCGAATACGTCGATGGCG    3100
GTCCTCCAAAGTCCGTGACGTTGGTCGCATCGGCCGCCGCGCCTGGAGCTGCCCAAGAGAAATCGAAGGTGGTGAAGTGCAGTCCAAAGCCAAATTCGTA    3200
GACCGGCGTGCCGGTGTACCACTTGTATGTACGCCCCGGGTTCGACGCGCTTGGGCGAAGGGT CATGTCAGTCATCGGAACCTGATCAGCGTAGATGGCT    3300
GGGTATTGGGTGATGGGCAGGCGTCCTGCAG                                                                        3331
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Figure 4 : Sequence of the gene coding for the laccase of *Pycnoporus cinnabarinus*

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AGATCTCCGAACCAGAAATGCGATTGCGTTCAGGCCCAATTAAGAATAAAGCTGCGTCAGGGCAGCGACGTA
TCTTGATCCATCATTGACTCACCGGCATCGGCGTCAACACCAAAGCAAGCTCGTCCCACCCATAGGCGTGCA
CCGGCCGGCGTGCGCCATTGAGGTACATGAGCGGGGCGAAAGTCCGCCATTGGTAGCCCTGTCGTGGACGCG
CGGCGATGAAACGTTTCCCACCATTGGGAAGAAACGTCTGCGGCCCATCATCCCTTCACCGGATGACAAGGC
GGCGTCGCGCCTTTGCCGCAGAGGCCGGCGGGCGACATGCACAGCGAAGGTCCGTTGCGGATGGGAAGCAGG
CAATCAGTGGGTGTCCTACGCCGCCACGATGGTCGGGGAGCGTAGGCGCCCTCCCATAAGGCGGCAAGCATC
ATGATGCTCTCCGATTCGGGAAGCCTGGTGCGATGCTGGAGAGACTCTCTCCGAGAGACCAGTGTGCGCAAC
GTTCCTGGCCTGGAAGACTTTAAAGTGAGTGTAGAAGGGCGAGCAGAGGACGATCATCGGATTGCAGGAACC
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CCTAGGCTATTCACACCTCCTTCGCAACATCCCTATTCACGGTGTCTGTAAGGAACGACTTGTCATGGGATC
ACATGAAGTGCAGCATACTGTTCGCCGGTCTCGCAGTACAGACGCTAGTACGGGAAGTCGACATCCAAGCGT
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TCATGAGGGAATGCCCACCGGATAGGGTGTGGCGGCCGCAATATTCATCGCCTGGCAATAGTCGATGTGCGT
CCTTGTTCAATGAATATCATGGGTCACATGTGGAGACGGTTAAACAGCGTTGACTGTGAATCCCTGGTGTGT
GTTGGGCCGAACAGGTACGTTGCAGGAACACCAATATCTCTTCGGCAGCCCAGTTCTTTGCGAGCGGCACAG
GCAGGCATCGCGCAACAGATCCCAGCCATCCGGCCTCTGACATTCGGGATACCTGAAGCCCTTCAGGTACGG
AGCGAAGAGGTGGGCTCTCTGCAGCGATTGGCGGACGGATAGCTGTATTTCCTCTCTCACCATTGGGAAGAT
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CTCGGAAAAATAAGAAGAATATTGTAGGTGCGTGTAGGCGTATCGCCCAAATGCGCACACACGGAGGCTTTA
GGAGATGAAGCGCCCGTGAGCGGTAAGGGAGTTGGTTCACCGCCGCCCCGACCGACTCTCTCTCTTTCCCAG
CATCATGTCTCGGCGCAAACTTTACCCTCTATTGACCAACTCCACGAGAAAGCAGGAACAGCTTCCTTGTCT
CTCATGACGTCCGCAATCCAGACCCTTAGCCGGTTCGTTACTCATCGTTATCCCTGCCGCCATGGTAGTGGA
GTCAGCCTGGCCAGTGCGTAGTCCCGTCTCTCTTGCTGCACTAGAGAAGCCCCATGAGACAGCGTTTTTTGC
TTTATTTCTGCTGTTTCTATAGACACCATAGGGGCAAACGATCCTGCACGCCCAGAGGTATTGGGCTCGTCA
GATTCCCAGTTTTTCTCCTCGGTCTGAATCGGCTGCACGGCAGATAAATCGGCCGGAAATGCTATAGCCCTT
CATAGCCCGCTATGAGAGTCGCAAAAGGCTTGTCAGTCAGGTCGGTCGAGTGGCTCTCACGAAGAGCGTCAA
CTTCGCGCGACAGCCGCCTTTCAGGGCAAGATAGATCCTCCCATCATCCCCTACTGCGCTCAGCGCCGGTAC
CGAACAATTGACTTACCGACATCCTCCGGGACGCGCAAATGCTGTTCGACGGAACGTAATCCTCTTCGTCCC
GCCTCTTTTCGCTCTCACGCATTCCGTGTGGTTCGCGCGACGGCCGCTCATCAGGACCAGACCAGTCTCAAT
GTCTGGTACCGGCACAATGGTGACACTGCGGCAACTGAGTAGGTCTGGTCACTCTGGTGCACCGTCGCTTAC
GCTGACCTTCGGGATACTGTCCTGCAGACATCTGGAGCGCCTGTCTTTCCCCTAGTATAAATGATGTCTGTC
CGCAGGTCCTTGAAGACCGCTCGAGTCCCACTTGAGTTTTAGGTAGGACCTGTCCACCAAACCCCTCTTTCT
GATCATG
```

Figure 5 : Sequence of the promoter sequence of the gene coding for the laccase of *Pycnoporus cinnabarinus* (up to the ATG coding for the methionine of the laccase).
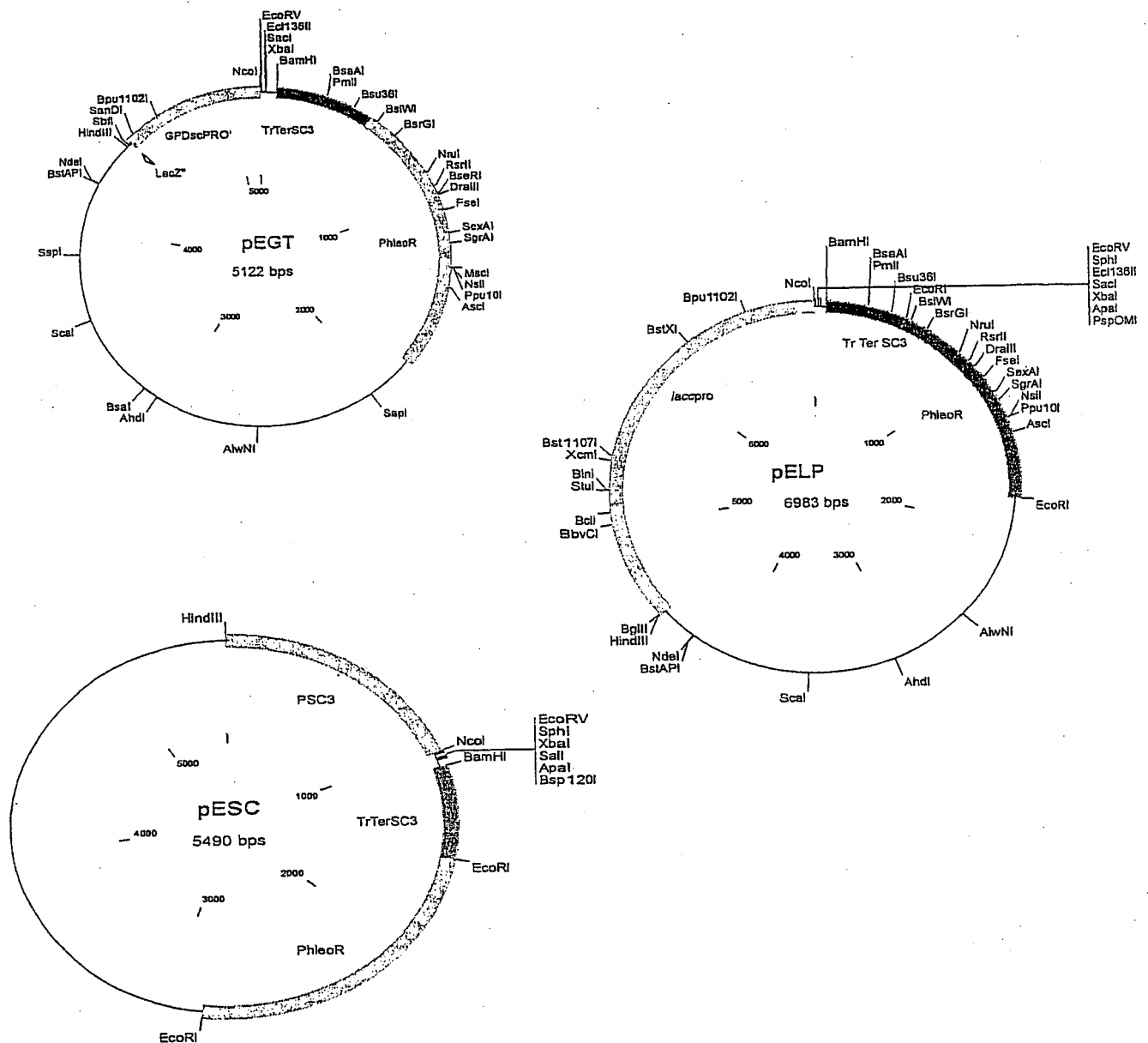
Figure 6 : Restriction map of the three expression vectors used for the production of laccase in *Pycnoporus cinnabarinus*.

CATGGGATATCGCATGCCTGCAGAGCTCTAGAGTCGACGGGCCCGGTACCGCGGCCGCCTTAAGACGCGTGGATCCGCAGGTGAAC
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TTCTCTATCCGCTCAGTCACGCGACCCCACACGTGCATGGTTGAACTTCGCCACGCAACAACCGCATGACGACATGGCGAACCTAAG
TAAAGGCTGAGTCGTGGACTAAAGCACTCCACTTTACGGCGAGGATGCCAGTCTACGTCATGAATGAAGCCTCAGGTCCCGAAGTAA
GGGGGTACAAAAGGAGGGTGAAAGGTGGACGTTTTCTTACCATCCTTCCACCTCCCAGACCACCATGCCGGGAATTCCCAGCTTGCT
CAAAAAGGTTCTGCCCGTACGCCCGCGAAATTCCTTCGAGGTGGCCCCTATCGCATACATGCACGACTTCAAAACATCCATTCTATC
ATTTTGGGATCGTACAATTATTAGACATGTTGTACAACGTTACATTCCTTTCTTCTTTTACTCTCCGGCCCAGTCTATGTAGAGGTAAA
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GAAGTCGTCCTCCACGAAGTCCCGGGAGAACCCGAGCCGGTCGGTCCAGAACTCGACCGCTCCGGCGACGTCGCGCGCGGTGAGCA
CCGGAACGGCACTGGTCAACTTGGCCATGCATGGTGATGGGCATTATGTGTGATGGGATGCGAGGAGGGGAAGTGCTCTGGATG
GGAGTGCTGGAGAAAGAGGGAGACGGCGGGCGGCGCGCCTTTTATACCCACGCCCGAAAGATCCGATCGATACTGACAAAACGGGA
TGAACACATCGGCGGCGGCCTGGACTGCGCGCCATCTGCAAATGCCCAGCCAGTCCCGTCGGGCGCCACCACCAGCCCTGGTCGAGT
CCCCCTCGAGGGCGACGCTCTATTCTATCCATGCGCGCAATTGCAGGTGCGCGGTCGAAGAACAGTCCTTCGCAGTCCTTCTCGCACC
TGGGCTGCGACCCTGTCTACCTCTCATCCTAACCCCTCCGCGGCTTCGCAGTACAGTTACTAATCTCACACCGAAGAGGCTCTCGCGC
CACCCTCCGATCCCGAGCACGTTCCTTACATGCCACAGCGTCAGAATTGAACACAATGCACGTCARATCAGATCCCCGGGAATTCGT
AATCATGGTCATAGCTGTTTCCTGTGTGAAATTGTTATCCGCTCACAATTCCACACAACATACGAGCCGGAAGCATAAAGTGTAAAG
CCTGGGGTGCCTAATGAGTGAGCTAACTCACATTAATTGCGTTGCGCTCACTGCCCGCTTTCCAGTCGGGAAACCTGTCGTGCCAGCT
GCATTAATGAATCGGCCAACGCGCGGGGAGAGGCGGTTTGCGTATTGGGCGCTCTTCCGCTTCCTCGCTCACTGACTCGCTGCGCTCG
GTCGTTCGGCTGCGGCGAGCGGTATCAGCTCACTCAAAGGCGGTAATACGGTTATCCACAGAATCAGGGGATAACGCAGGAAAGAA
CATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAACCGTAAAAAGGCCGCGTTGCTGGCGTTTTTCCATAGGCTCCGCCCCCCTGACG
AGCATCACAAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGGACTATAAAGATACCAGGCGTTTCCCCCTGGAAGCTCC
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TTATCCGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGA
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CTGCTGAAGCCAGTTACCTTCGGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCGGTGGTTTTTTTGTTT
GCAAGCAGCAGATTACGCGCAGAAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGGAACGAA
AACTCACGTTAAGGGATTTTGGTCATGAGATTATCAAAAAGGATCTTCACCTAGATCCTTTTAAATTAAAAATGAAGTTTTAAATCAA
TCTAAAGTATATATGAGTAAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTTCGTTC
ATCCATAGTTGCCTGACTCCCCGTCGTGTAGATAACTACGATACGGGAGGGCTTACCATCTGGCCCCAGTGCTGCAATGATACCGCG
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ACAGGCATCGTGGTGTCACGCTCGTCGTTTGGTATGGCTTCATTCAGCTCCGGTTCCCAACGATCAAGGCGAGTTACATGATCCCCCA
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TGTATGCGGCGACCGAGTTGCTCTTGCCCGGCGTCAATACGGGATAATACCGCGCCACATAGCAGAACTTTAAAAGTGCTCATCATT
GGAAAACGTTCTTCGGGGCGAAAACTCTCAAGGATCTTACCGCTGTTGAGATCCAGTTCGATGTAACCCACTCGTGCACCCAACTGA
TCTTCAGCATCTTTTACTTTCACCAGCGTTTCTGGGTGAGCAAAAACAGGAAGGCAAAATGCCGCAAAAAAGGGAATAAGGGCGAC
ACGGAAATGTTGAATACTCATACTCTTCCTTTTTCAATATTATTGAAGCATTTATCAGGGTTATTGTCTCATGAGCGGATACATATTTG
AATGTATTTAGAAAAATAAACAAATAGGGGTTCCGCGCACATTTCCCCGAAAAGTGCCACCTGACGTCTAAGAAACCATTATTATCA
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GCGTCGCCCTCGAGGGGGACTCGACCAGGGCTGGTGGTGGCGCCCGACGGGACTGGCTGGGCATTTGCAGATGGCGCGCAGTCCAG
GCCGCCGCCGATGTGTTCATCCCGTTTTGTCAGTATCGATCGGATCTTTCGGGCGTGGGTATAAAAGCGCGCCGCCCGCCGTCTCCCT
CTTTCTCCAGCACTCCCATCCAGAGCACTTCCCTCTCCCATCGCATCCCATCACACAATAATGCCCATCAC

Figure 7 : Nucleotide sequence of the vector pEGT, containing the gpd gene promoter (4480-5112), a phleomycin resistance marker (507-1822) and the sc3 gene terminater (71-507).

```
AGCTTCTCCGGCCCCGAATCGAACGGCAGGATGTGTGGGCGTGTCCAATATTGCCATGAAAATCTGTCAGAAGTGAGCCCTCTCGTCAC
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CAGTCTACGTCATGAATGAAGCCTCAGGTCCCGAAGTAAGGGGGTACAAAAGGAGGGTGAAAGGTGGACGTTTTCTTACCATCCTTCCA
CCTCCCAGACCACCATGCCGGGAATTCCCAGCTTGCTCAAAAAGGTTCTGCCCGTACGCCCGCGAAATTCCTTCGAGGTGGCCCCTATCG
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GTCGCGCGCGGTGAGCACCGGAACGGCACTGGTCAACTTGGCCATGCATGGTGATGGGCATTATGTGTGATGGGATGCGATGGGAGAG
GGAAGTGCTCTGGATGGGAGTGCTGGAGAAAGAGGGGAGACGGCGGGCGGCGCGCCTTTTATACCCACGCCCGAAAGATCCGATCGATA
CTGACAAAACGGGATGAACACATCGGCGGCGGCCTGGACTGCGCGCCATCTGCAAATGCCCAGCCAGTCCCGTCGGGCGCCACCACCA
GCCCTGGTCGAGTCCCCCTCGAGGGCGACGCTCTATTCTATCCATGCGCGCAATTGCAGGTGCGCGGTCGAAGAACAGTCCTTCGCAGT
CCTTCTCGCACCTGGGCTGCGACCCTGTCTACCTCTCATCCTAACCCCTCCGCGGCTTCGCAGTACAGTTACTAATCTCACACCGAAGAG
GCTCTCGCGCCACCCTCCGATCCCGAGCACGTTCCTTACATGCCACAGCGTCAGAATTGAACACAATGCACGTCARATCAGATCCCCGG
GAATTCGTAATCATGGTCATAGCTGTTTCCTGTGTGAAATTGTTATCCGCTCACAATTCCACACAACATACGAGCCGGAAGCATAAAGTG
TAAAGCCTGGGGTGCCTAATGAGTGAGCTAACTCACATTAATTGCGTTGCGCTCACTGCCCGCTTTCCAGTCGGGAAACCTGTCGTGCCA
GCTGCATTAATGAATCGGCCAACGCGCGGGGAGAGGCGGTTTGCGTATTGGGCGCTCTTCCGCTTCCTCGCTCACTGACTCGCTGCGCTC
GGTCGTTCGGCTGCGGCGAGCGGTATCAGCTCACTCAAAGGCGGTAATACGGTTATCCACAGAATCAGGGGATAACGCAGGAAAGAAC
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GGTATCTCAGTTCGGTGTAGGTCGTTCGCTCCAAGCTGGGCTGTGTGCACGAACCCCCCGTTCAGCCCGACCGCTGCGCCTTATCCGGTA
ACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTA
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ACCTTCGGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCGGTGGTTTTTTTGTTTGCAAGCAGCAGATTACG
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GCGTTTCGGTGATGACGGTGAAAACCTCTGACACATGCAGCTCCCGGAGACGGTCACAGCTTGTCTGTAAGCGGATGCCGGGAGCAGAC
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CATATGCGGTGTGAAATACCGCACAGATGCGTAAGGAGAAAATACCGCATCAGGCGCCATTCGCCATTCAGGCTGCGCAACTGTTGGGA
AGGGCGATCGGTGCGGGCCTCTTCGCTATTACGCCAGCTGGCGAAAGGGGGATGTGCTGCAAGGCGATTAAGTTGGGTAACGCCAGGGT
TTTCCCAGTCACGACGTTGTAAAACGACGGCCAGTGCCA
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Figure 8 : Nucleotide sequence of the vector pESC, containing the sc3 gene promoter (1-1033), a phleomycin resistance marker (1540-2855) and the sc3 gene terminater (1104-1540).

```
CATGGGATATCGCATGCCTGCAGAGCTCTAGAGTCGACGGGCCCGGTACCGCGGCCGCCTTAAGACGCGTGGATCCGCAGGTGAACGCGC
CTATCGGTGGGATATTCGGGCGACGGGAGCCTCGGCAATCTGAGCCTCGTTACTGCCTAGCAAATTCGGAATCCCTTCGATGTCATAGGGT
CGCGGACAAGTGATCGTCTTGCTACATACTCCAAGGTGTTGACTCATTCCCTCGATAATGAACATTGTTGTTGTTGTTTGTTCTCTATCCGC
TCAGTCACGCGACCCCACACGTGCATGGTTGAACTTCGCCACGCAACAACCGCATGACGACATGGCGAACCTAAGTAAAGGCTGAGTCGT
GGACTAAAGCACTCCACTTTACGGCGAGGATGCCAGTCTACGTCATGAATGAAGCCTCAGGTCCCGAAGTAAGGGGGTACAAAAGGAGG
GTGAAAGGTGGACGTTTTCTTACCATCCTTCCACCTCCCAGACCACCATGCCGGGAATTCCCAGCTTGCTCAAAAAGGTTCTGCCCGTACG
CCCGCGAAATTCCTTCGAGGTGGCCCCTATCGCATACATGCACGACTTCAAAACATCCATTCTATCATTTTGGGATCGTACAATTATTAGA
CATGTTGTACAACGTTACATTCCTTTCTTCTTTTACTCTCCGGCCCAGTCTATGTAGAGGTAAAGTACAAGCGTCCAAAGGATCAGGCACTT
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CAGAACTCGACCGCTCCGGCGACGTCGCGCGCGGTGAGCACCGGAACGGCACTGGTCAACTTGGCCATGCATGGTGATGGGCATTATGTG
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TGATGACGGTGAAAACCTCTGACACATGCAGCTCCCGGAGACGGTCACAGCTTGTCTGTAAGCGGATGCCGGGAGCAGACAAGCCCGTCA
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GGGCAGCGACGTATCTTGATCCATCATTGACTCACCGGCATCGGCGTCAACACCAAAGCAAGCTCGTCCCACCCATAGGCGTGCACCGGC
CGGCGTGCGCCATTGAGGTACATGAGCGGGGCGAAAGTCCGCCATTGGTAGCCCTGTCGTGGACGCGCGGCGATGAAACGTTTCCCACCA
TTGGGAAGAAACGTCTGCGGCCCATCATCCCTTCACCGGATGACAAGGCGGCGTCGCGCCTTTGCCGCAGAGGCCGGCGGGCGACATGCA
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Figure 9 : Nucleotide sequence of the vector pELP, containing the laccase gene (promoter 4457-6983) , a phleomycin resistance marker (507-1822) and the sc3 gene terminater (71-507) (continuation of the sequence on the following page).

```
CAGCGAAGGTCCGTTGCGGATGGGAAGCAGGCAATCAGTGGGTGTCCTACGCCGCCACGATGGTCGGGGAGCGTAGGCGCCCTCCCA
TAAGGCGGCAAGCATCATGATGCTCTCCGATTCGGGAAGCCTGGTGCGATGCTGGAGAGACTCTCTCCGAGAGACCAGTGTGCGCAAC
GTTCCTGGCCTGGAAGACTTTAAAGTGAGTGTAGAAGGGCGAGCAGAGGACGATCATCGGATTGCAGGAACCATCGGCATCCTCAGC
CTGGGAAGGATGGCTCTTGGTAGACATTCGCGGAAGGTGTCCTAGATGTGAGCGGGCTTCTTGGATGATCATGTCGTAACTTTTTCTGA
CCTCGTCGGTGGTACGCATGGCAGGATTGAGCATTACGGTATGCCTCCCATTCATAAACGATAACCCCTTCCTTCAGGTTGGTCATCTC
CATAGAGCGGCACGCTCTCAAGGCCTAGGCTATTCACACCTCCTTCGCAACATCCCTATTCACGGTGTCTGTAAGGAACGACTTGTCAT
GGGATCACATGAAGTGCAGCATACTGTTCGCCGGTCTCGCAGTACAGACGCTAGTACGGGAAGTCGACATCCAAGCGTTCAGTCACCA
CATGGCAAAAAAGCTGCACCATACTCTTTATGGTGAGTTGTTCGTGAGTGGTATACAGTCATTCATGAGGGAATGCCCACCGGATAGG
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GTTGGTAAGTCCCGCAATCTGCGGTTCAGGCAACAGTCTCGGAAAAAATAAGAAGAATATTGTAGGTGCGTGTAGGCGTATCGCCCAAA
TGCGCACACACGGAGGCTTTAGGAGATGAAGCGCCCGTGAGCGGTAAGGGAGTTGGTTCACCGCCGCCCCGACCGACTCTCTCTCTTT
CCCAGCATCATGTCTCGGCGCAAACTTTACCCTCTATTGACCAACTCCACGAGAAAGCAGGAACAGCTTCCTTGTCTCTCATGACGTCC
GCAATCCAGACCCTTAGCCGGTTCGTTACTCATCGTTATCCCTGCCGCCATCGTAGTGGAGTCAGCCTGGCCAGTGCGTAGTCCCGTCT
CTCTTGCTGCACTAGAGAAGCCCCATGAGACAGCGTTTTTTGCTTTATTTCTGCTGTTTCTATAGACACCATAGGGGCAAACGATCCTG
CACGCCCAGAGGTATTGGGCTCGTCAGATTCCCAGTTTTTCTCCTCGGTCTGAATCGGCTGCACGGCAGATAAATCGGCCGGAAATGCT
ATAGCCCTTCATAGCCCGCTATGAGAGTCGCAAAAGGCTTGTCAGTCAGGTCGGTCGAGTGGCTCTCACGAAGAGCGTCAACTTCGCG
CGACAGCCGCCTTTCAGGGCAAGATAGATCCTCCCATCATCCCCTACTGCGCTCAGCGCCGGTACCGAACAATTGACTTACCGACATC
CTCCGGGACGCGCAAATGCTGTTCGACGGAACGTAATCCTCTTCGTCCCGCCTCTTTTCGCTCTCACGCATTCCGTGTGGTTCGCGCGA
CGGCCGCTCATCAGGACCAGACCAGTCTCAATGTCTGGTACCGGCACAATGGTGACACTGCGGCAACTGAGTAGGTCTGGTCACTCTG
GTGCACCGTCGCTTACGCTGACCTTCGGGATACTGTCCTGCAGACATCTGGAGCGCCTGTCTTTCCCCTAGTATAAATGATGTCTGTCC
GCAGGTCCTTGAAGACCGCTCGAGTCCCACTTGAGTTTTAGGTAGGACCTGTTCCTCCACAACCCCTCTTTC
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Figure 9 : Nucleotide sequence of the vector pELP (continuation), containing the laccase gene (promoter4457-6983), a phleomycin resistance marker (507-1822) and the sc3 gene ternminater (71-507).
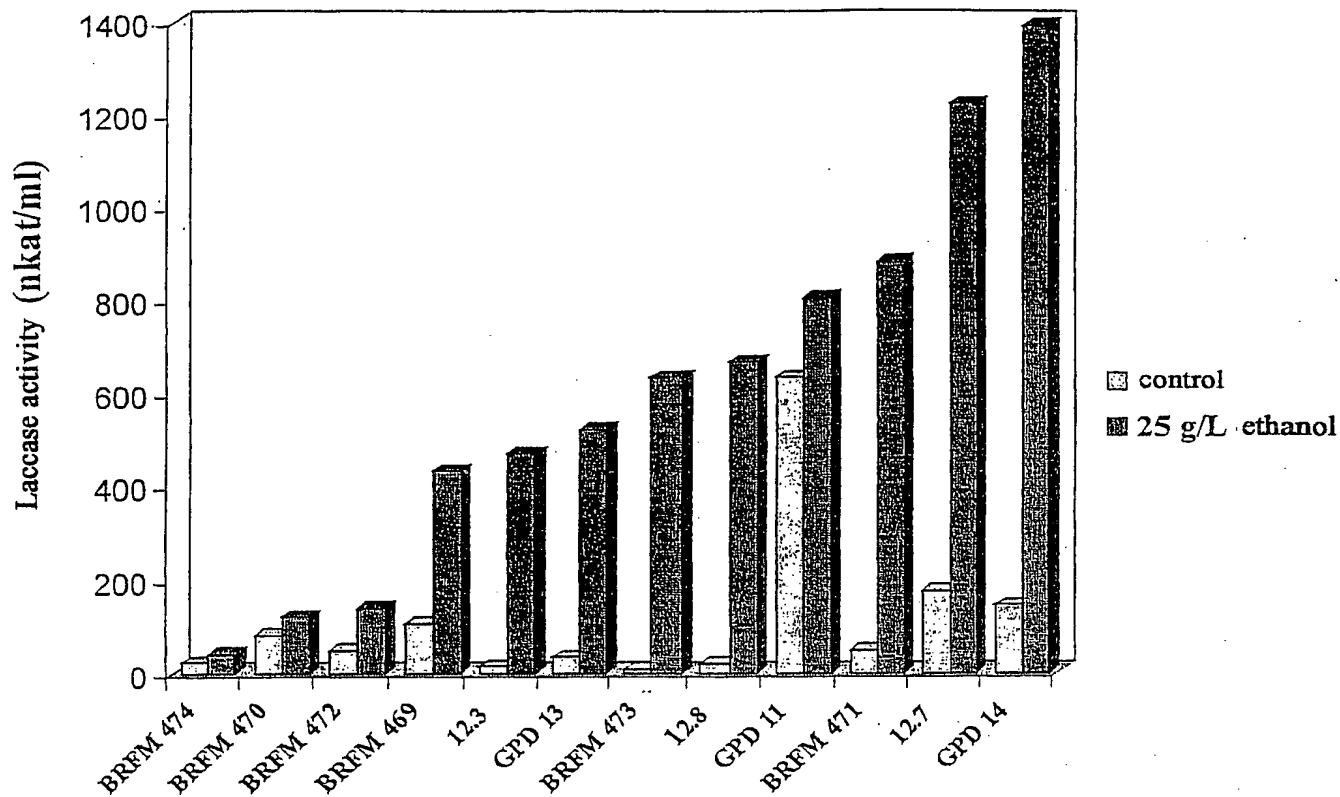
Figure 10 : Results of production of the transformants having the most significant activities. The culture was carried out with or without (control) ethanol.
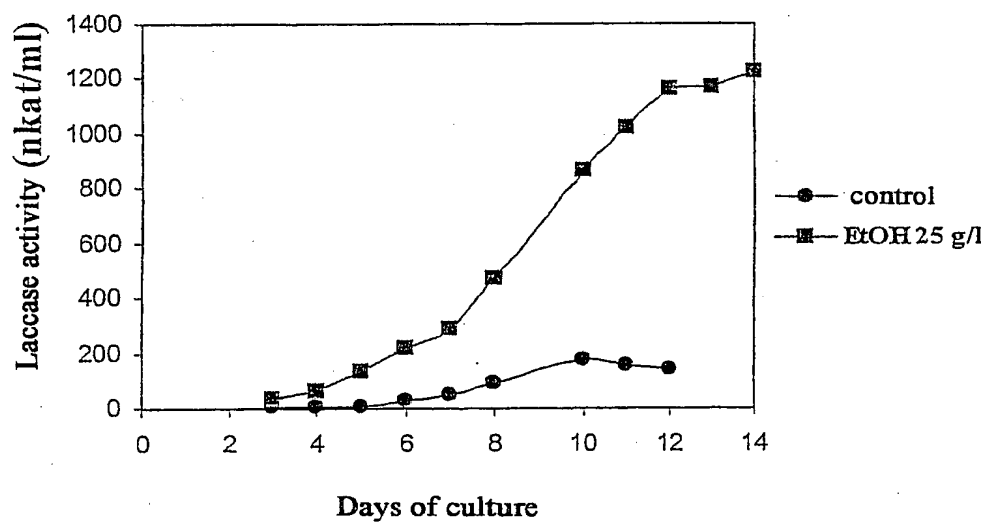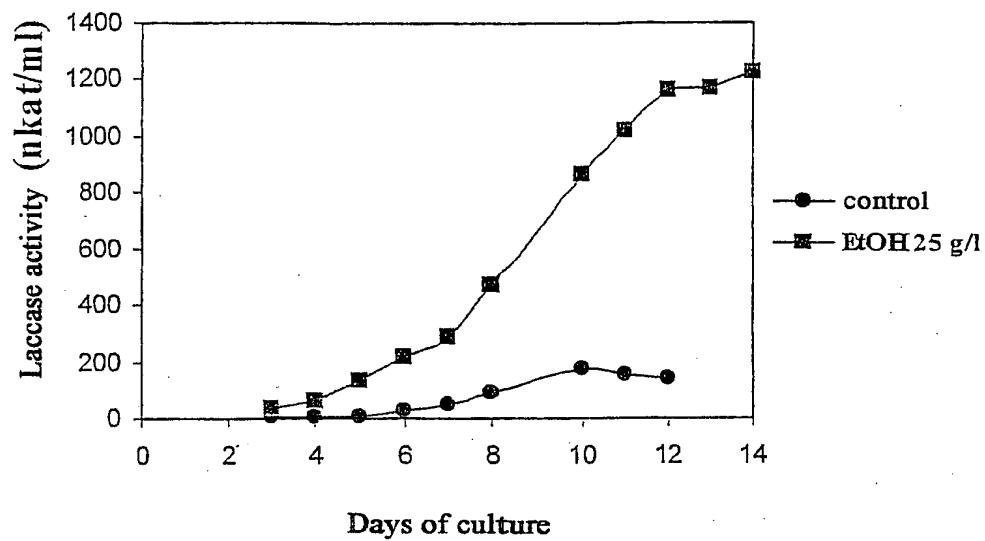
Figure 11 : Monitoring of the laccase activities of the transformants GPD 14 and 12.7 as a function of time with or (control) without ethanol

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TGGGGAGATGGTTCTATATATCAAAATGATCTTCTGTCCTGAGCTTTCCTCGTCCTTGTTTTCGTCTTGTCAGTGCCGCGACATGCTTTTATTAAACCAT   100

TGGCGAGCTGCCCGCGCCCAAGGAGATAGCATAATCGCCTGAGAAACCTAGTCGTCTCATGGCCGTGTAACCGTTCTTGCGACTTATTTTCGCACTTCTC   200

TCAGAATATAAAGGCCTATTGTGATACGGTTCATCTAACCCCAGCGTCCCCTCCGAAAGATGGGCTGCCTCTCACTCTTCGCATTCCTTACTGCTTTAAA   300
                                                         M  G  C  L  S  L  F  A  F  L  T  A  L  N    14
CTCAGTTCATGCCGCTGTGGGTCCCGTTACGGACTTAACACTGATCGTAGATACTGTCGCCCCCGACGGTGCTGCTTTCGCGCGGGAAGGTGAGACTTTG   400
  S  V  H  A  A  V  G  P  V  T  D  L  T  L  I  V  D  T  V  A  P  D  G  A  A  F  A  R  E            43
CGACTGTAAATGCCGGATTTGAGTTTCTAATTATAATCTTCCAAGCCATTGTCGTCCAAGAGGAACCAAACTCCGTCATTGGTCCGGTCATCGTAGGTGGG   500
                                     A  I  V  V  Q  E  E  P  N  S  V  I  G  P  V  I  V           60
TAGCTACGAGTCTTCCTCCTTCATTTAGCTCATCACCAAGTGATATGATATTAATTAAGGTCAAAAGGGGGACAACTTTCGGCTCAATGTTATCAACAAT   600
                                                    G  Q  K  G  D  N  F  R  L  N  V  I  N  N    74
TTGGATTCTCCGAACATGCGCCAATCTACTTCCATTCATTGGCATGGCATCTTCCAAGGAAACGGTACGTGGTATATCGGATAATCTATCTGTATCCATT   700
  L  D  S  P  N  M  R  Q  S  T  S  I  H  W  H  G  I  F  Q  G  N                               95
GACTCGAATATAGGTCAGAATTGGGCTGGTGCGTTGGCCTTCCTGAAGCCTGCTCGAATTTATCTTCCTGAATTTTTAGATGGCGCCGCATTCGTTAACC   800
     G  Q  N  W  A                                            D  G  A  A  F  V  N          107
AGGTAAGGAGATGTTCCTGCCTTCGTTTCCCCAGAACTAATTATCCTAGTGCCCCATTGCCCCCGGAGGGGACTCGTTCTTGTACGACTTTACCGAACCT   900
Q                                     C  P  I  A  P  G  D  S  F  L  Y  D  F  T  E  P         125
TTCCAGACTGGCACATTTTGGTATCATTCCCATTTATCAACTCAATACTGCGATGGACTGAGGGGAGCATTCGTCGTTCGTTCTCTTCTTCATCAAGTCA   1000
F  Q  T  G  T  F  W  Y  H  S  H  L  S  T  Q  Y  C  D  G  L  R  G  A  F  V                   150
CCGCTTTCTTCTCACTTATCTAGATCTACGATCCGCTCGACCCTTACCGGTTGCTCTACGATGTCGACGACGAGTCGACTGTGATTACTCTGGCGGACTG   1100
          I  Y  D  P  L  D  P  Y  R  L  L  Y  D  V  D  D  E  S  T  V  I  T  L  A  D  W      176
GTACCACAGCTATGCGGAGGACATTCTAATCGCGTAGGAGATTTTCCCAAGATGTCTCCTCTGCCTCTCTGAAATCCATGAACTAGTGCAGGCGACACTA   1200
  Y  H  S  Y  A  E  D  I  L  I  A                                         A  G  D  T        191
TCCTCATCAATGGTCACGGAAGATTCGCCGGAGCCGGCGGAACGGCAACAGAACTATCTGTCATTACTGTTGATGGAAGCGGTAGGCATTCTCCCT       1300
I  L  I  N  G  H  G  R  F  A  G  A  G  G  T  A  T  E  L  S  V  I  T  V  E  H  G  K  R         220
CGGCTTTGTAGATGTGTCTAATTTGTGATAGCTACCGATTGCGATTTGCCAATATCGCTTGTGACCCTTGGTTTGCCGTGAAAATCGATAGCCATACGAA   1400
          Y  R  L  R  F  A  N  I  A  C  D  P  W  F  A  V  K  I  D  S  H  T  N            243
CCTTCGCGTTATCGAAGCTGACGGTATTACTACTGTGCCTGTCACGGTGGACTCCTTCAATGTAGGCTTACCCTTAGCACTTTCCCACTCTGGATCCTCT   1500
L  R  V  I  E  A  D  G  I  T  T                                                           254
TATGACTTCCCAAGATCTTTGTGGGCCAACGATATAGTGTCATCCTCCATGCCAACCAGCCTGTTGGAAACTACTGTAAGCTGCCTAAATGTTGCATGAC   1600
          I  F  V  G  Q  R  Y  S  V  I  L  H  A  N  Q  P  V  G  N  Y                      274
TGTCCATGATTCTAACCCCGCCAGGGATTCGGGCCGCTCCGAACGGCGTGAGCAATTTCGCGGGTGGGATCGGACTCGGCTATTCTCCGTTATGTTGGCGC   1700
     W  I  R  A  A  P  N  G  V  S  N  F  A  G  G  I  D  S  A  I  L  R  Y  V  G  A         300
CCCAGAAGAAGAGCCCAACACTAGTGAGGATACTCCATCCGACACACTTCAAGAGCAGGATCTTCACCCGCTGATCCTACCCGGCGCGCCAGGCATCCAC   1800
  P  E  E  E  P  N  T  S  E  D  T  P  S  D  T  L  Q  E  Q  D  L  H  P  L  I  L  P  G  A  P  G  I  H   333
TCCCGTGGGGCCGCCGACGTTGTCCACACCGTATCAATGGAGTTTGTGAGTGTGGCGACTTTTCTGGCCCCCTTTATTAATATAATCTGGTTAGGATGGC   1900
S  R  G  A  A  D  V  V  H  T  V  S  M  E  F                                               348
GCAAACTTCCAATTCCTCCTGGATGGCGTGGCCTTCCAGCCGTGCGTCATCTCTTTCAAAGAATTTATCTAGCTGACGATTTTGAAATGTAGCCGACCA   2000
                                                   L  T  I  L  K  C  S  P  T            357
TGCCCGTCCTTCTGCAAATATTATCGGGAGCGCAGACTGCTAATACCCTTCTCCCGGCGGGATCCTTTATCCAAGCGTCGCACAATGACATCGTGGAGCT   2100
M  P  V  L  L  Q  I  L  S  G  A  Q  T  A  N  T  L  L  P  A  G  S  F  I  Q  A  S  H  N  D  I  V  E  L   391
CAATTTCCCAGCTGTCAACGTAGCCGCTGTCGGTGGACCGTGCGTCCCATCTTTCCTTGCCAGCTTGAAATTTACGCTCTTTTAGACATCCAATCCATCT   2200
N  F  P  A  V  N  V  A  A  V  G  P                                          H  P  I  H  L    409
GTGAGGCGCAGCGGGACCTTTGGCCTTATGGCATATGACTTATTATTAGCCATGGCCATGCGATTCGACGTTATACGCTCTGCTGGAACGAACTCCGATAACT   2300
GTGAGGCGCAGCGGGACCTTTGGCCTTATGGCATATGACTTATTATTAGCCATGGCCATGCGATTCGACGTTATACGCTCTGCTGGAACGAACTCCGATAACT
     G  G  H  A  F  D  V  I  R  S  A  G  T  N  S  D  N                           426
GGTTCAATCCGGTATTTTCATTCGACTTCCATAAGATGACGATGGCTCACTATGGTTTTTACCCAGCCTCGCAGAGATGTCGTATCCACCGGTACCGATC   2400
W  F  N  P                                    P  R  R  D  V  V  S  G  T  D            441
CTAATGACAATGTGTACGTGTTTCGCTATTGATTGTCCGTTTTGATTTGACTGTTGGACAGCACCATTCGCTTCCGGGCCGACAACCCGTACGTAAACTG   2500
P  N  D  N  V                                   T  I  R  F  R  A  D  N  P               455
CTGAATCTCTCGTTGTCTTTGGTTCTCATAATCTCATCAGAGGTCCATGGTTCCTTCACTGCCACATTGACTGGCACCTTGAACTCGGCTTTGCTTTGGT   2600
          G  P  W  F  L  H  C  H  I  D  W  H  L  E  L  G  F  A  L  V                     475
GATTGCAGAAGCGCCTAGCGAATGGGACAGCGACATTAACCCTCCTGGTGCGCTGCCTGTGAACCTTTTCTCCCTACACTTGCTAAGATCGCTCTAGCTG   2700
I  A  E  A  P  S  E  W  D  S  D  I  N  P  P                                        A    491
CGTGGGATGACCTATGCCCTACGTTCGCTGGCTTCTCTTTTACTATTCAAGTTTCCTCACATTCTCAACTTCACAGATATGATGCCCTGCCGCCTGAG   2800
A  W  D  D  L  C  P  T  F  A  W  L  L  F  Y  Y  F  K  F  P  H  I  L  N  F  T  D  M  M  P  C  R  L  S   525
CAGCAGTAATCGAGTTAAGAACCTCAACGTTGACTAAGGAAAAAGCAAAGCAGAATATGAAACTCTCATTTATCTTTATATCGACACATTCACTATTCAA   2900
S  S  N  R  V  K  N  L  N  V  D  .                                                    536
CCTACGGATTTTCCCTCGCACCTGAATTTCGGTGCTAGATCCCCATCCTTGGTGGAGTAGGAAAGAAATTTCTTGTATAAAACCCATGGGTTCTTCTACC   3000

AATATATACATAACGTCCGTGGGGTTAGTTAATTCGT                                                     3037
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Gene of the laccase of *Halocyphina villosa*

Figure 12